

CAPITAL INVESTMENT DECISIONS
METHODS OF ANALYSIS

GUIDELINES AND RESOURCE MATERIALS
FOR EDUCATIONAL MEETINGS

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THE OHIO STATE UNIVERSITY, COLUMBUS, OHIO, MAY 1979

IMPORTANCE

U.S. FARM CAPITAL PURCHASES
\$35 BILLION - 1979 EST.

INDIVIDUALLY

\$1,000 - \$1,000,000 +

DIFFICULTIES

EXPENDITURES

CURRENT

LUMPY

BENEFITS

FUTURE

PREDICTIVE ABILITY

COSTS - RETURNS

5 - 10 - 20 YEARS

METHOD OF ANALYSIS

ECONOMICALLY SOUND

USEABLE

MEASURES OF INVESTMENT WORTH

NUMEROUS - ALMOST AS MANY AS THERE ARE
DECISION - MAKERS

RANGE - CHANCE TO SUPER - COMPLEX

A FEW COMMON METHODS

URGENCY

PARTIAL BUDGET

PAYBACK

RETURN ON INVESTMENT

TERMINAL NET WORTH

DISCOUNTED CASH FLOWS

NET PRESENT VALUES

INTERNAL RATE OF RETURN

COMPOUNDED CASH FLOWS

NET TERMINAL VALUES

LITERATURE IS CONSISTENT ON METHODS

SOME UNRESOLVED ISSUES HOWEVER

INCLUSION OF FINANCING

DISCOUNT RATES

URGENCY

COMMON

LEGITIMATE

REQUIRES LITTLE EFFORT

LITTLE TIME AVAILABLE

COMMON SENSE DECISIONS

REPLACING MOTOR

DO NOT WARRANT FORMAL ANALYSIS

PROCRASTINATOR

MAJOR DECISIONS

BASES FOR DECISIONS

GUESSES

HUNCHES

INTUITION

SUBJECTIVE EVALUATION

NO FORMULAS

PAYBACK PERIOD

FORMAL - SIMPLE - COMMONLY USED

DEFINE: YEARS TO RECOVER INVESTMENT

USE: REJECT IF EXCEEDS MAXIMUM ACCEPTABLE

FORMULA:

$$P = \frac{I}{E}$$

WHERE: P = PAYBACK PERIOD (YRS.)

I = INVESTMENT

E = ADDED ANNUAL AVERAGE
AFTER-TAX NET CASH

SUPPORTS

DISCOUNTING EFFECT OF UNCERTAINTY AND TIME
TIMING OF CASH FLOW IS IMPORTANT

PROBLEMS

NO CONSIDERATION OF TIMING DIFFERENCES
PRIOR TO PAYBACK
AFTER PAYBACK
CAN LEAD TO WRONG DECISIONS

RETURN ON INVESTMENT

SIMPLE - EASY TO USE - COMMONLY USED

DEFINE: AVERAGE ANNUAL NET INCOME (AFTER
DEPRECIATION) AS PERCENT OF INVESTMENT

FORMULA:
$$R = \frac{E - D}{I}$$

WHERE: R = RATE OF RETURN

E = ADDED ANNUAL AVERAGE AFTER - TAX
NET CASH

D = DEPRECIATION

I = INVESTMENT (INITIAL OR AVERAGE)

SUPERIOR TO PAYBACK

CONSIDERS LIFE OF ASSET

WEAKNESSES

RATE NOT COMPARABLE

FAILS TO CONSIDER TIMING

CAN LEAD TO WRONG DECISION

DISCOUNTED CASH FLOWS

ADVANTAGES

CONSIDER TIMING OF CASH FLOWS

MEANINGFUL CUT - OFF CRITERION

METHODS

NET PRESENT VALUE

INTERNAL RATE OF RETURN

BOTH METHODS

SAME FORMULA

SAME CASH FLOW

SAME MINIMUM RATE

FORMULA:

$$NPV = -I + \frac{E_1}{1 + I} + \frac{E_2}{(1 + I)^2} + \dots + \frac{E_N}{(1 + I)^N} + \frac{E_S}{(1 + I)^N}$$

WHERE: NPV = NET PRESENT. VALUE

I = INVESTMENT

E_N = ANNUAL AFTER - TAX CASH FLOW

E_S = SALVAGE VALUE

I = DISCOUNT RATE

NPV METHOD: i PREDETERMINED
SOLVE FOR NPV
SINGLE SOLUTION

IRR METHOD: $NPV = 0$
SOLVE FOR i
TRIAL AND ERROR
LINEAR INTERPOLATION
MULTIPLE SOLUTIONS (i)

BOTH METHODS

RESULT IN CORRECT ANSWERS
EVALUATE INDIVIDUAL PROJECTS
RANK ALTERNATIVE PROJECTS
CONSIDERS

COST OF CAPITAL
RISK
UNCERTAINTY
INFLATION
PROFITABILITY
FEASIBILITY

NPV SUPERIOR

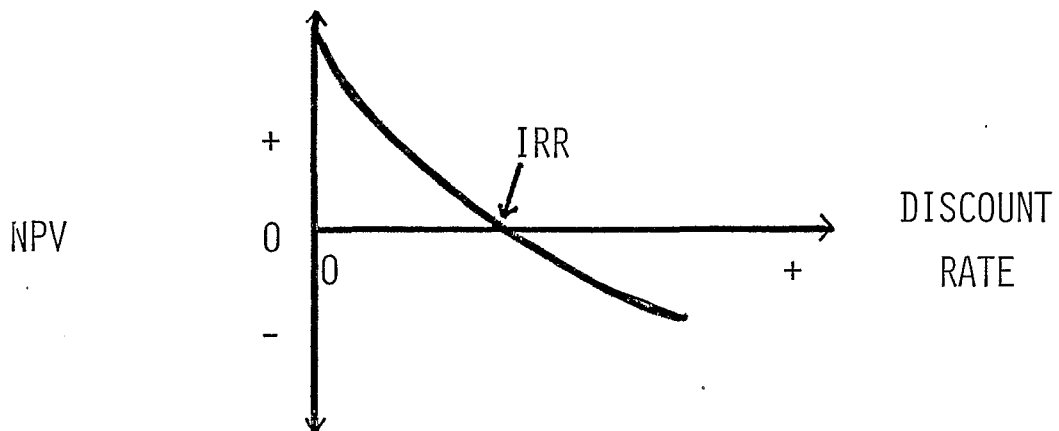
EASIER

FEWER PROBLEMS

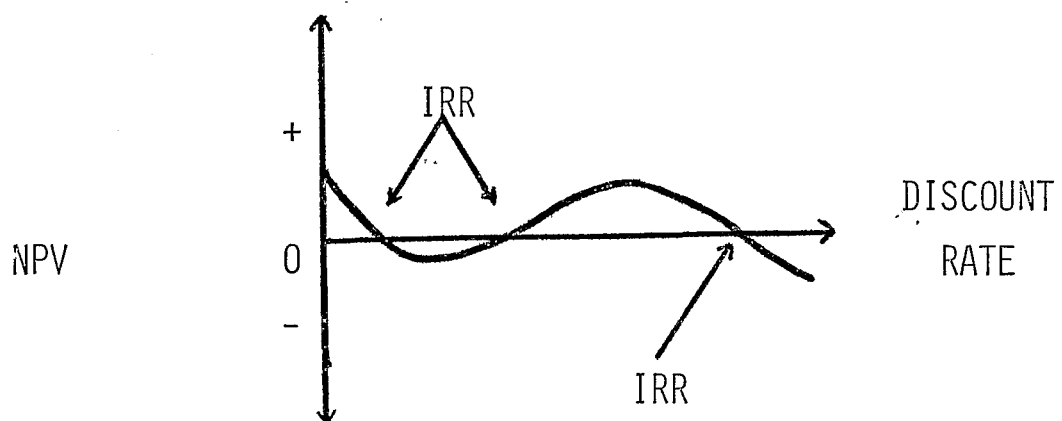
WEIGHTED VALUE OF INVESTMENT WORTH

IRR MULTIPLE SOLUTION PROBLEM

NORMAL RELATIONSHIP



ABNORMAL RELATIONSHIP



INCLUSION OF FINANCING CASH FLOWS ?

EXPERTS DISAGREE

NO - BIERMAN/SMIDT
MOST OTHERS

YES - BARRY/HOPKINS/BAKER

YES/NO - CASLER/APLIN
LEE

BOTH APPROACHES INTUITIVELY APPEALING

BIERMAN

SEPARABLE DECISIONS

INCLUSION - DOUBLE COUNTS INTEREST
- CAN MAKE - NPV TURN +

BARRY

CASH FLOW CONCEPT

EXCLUSION - PREMATURE CASH FLOW

INCLUSION - INTEREST IS PART OF CASH FLOW
- DOES NOT DOUBLE COUNT INTEREST

DOUBLE COUNTING INTEREST ?

BOTH ARE CORRECT - DIFFERENT ASSUMPTIONS

BIERMAN

CAPITAL LUMP SUM AT BEGINNING

BARRY

CAPITAL AMORTIZED

INCLUSION OF FINANCING CASH FLOWS

IN BARRY FASHION DOES NOT

DOUBLE COUNT INTEREST

SEPARABLE DECISION ?

BIERMAN

ANALYZE PROJECT

- NPV --- REJECT

+ NPV --- ACCEPT

ANALYZE FINANCING

SELECT LEAST COST

BARRY

ANALYZE PROJECT - FINANCING PACKAGES

ACCEPT OR REJECT

BARRY A SPECIAL CASE OF BIERMAN

ASSUMING 1 FINANCE PACKAGE

PROBLEM!

SAME INVESTMENT

BIERMAN PROJECT NPV - (REJECT)

BARRY PACKAGE NPV + (ACCEPT)

FARMERS ASKING BARRY TYPE QUESTION

BETTER OR WORSE OFF BY PARTICULAR

INVESTMENT - FINANCE PACKAGE ?

| SUMMARY

OVERWHELMING EVIDENCE - NPV BEST

SOME CONCEPTUAL PROBLEMS REMAIN

CONVINCED BARRY IS CORRECT

DOES NOT DOUBLE COUNT INTEREST

DECISIONS NOT USUALLY SEPARABLE

CONSISTENT WITH CASH FLOW CONCEPTS

NEED FOR MATERIALS AND PROGRAMS

UNDERSTANDING

USE

